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ABSTRACT

This report, an update of the National Coalition for Technology Education and Training's (NCTET) 1994 "National Information Infrastructure Requirements for Education and Training," is intended to serve as a guide for national and state policy makers and planners concerned with the role of technology in education. It begins with a review of recent documentation on the benefits of technology. The review is followed by a description of the extent to which the four established national goals for technology in education (professional development, access to technology, connectivity to the information superhighway, and technology-based learning resources) have been implemented. Specific details of the progress already made toward accomplishing these goals, unmet needs that deter their accomplishment, and actions required to continue progress toward their realization are included in each section. NCTET has added a fifth goal to address the need for support implemented in a timely and equitable manner. Included is a list of Consortium for School Networking Board of Directors as of December 19, 1997, with addresses, phone numbers, category/expiration, and terms. (AEF)

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National Coalition for Technology in Education & Training

1997 Educational Technology Goals, Progress, and Recommended Actions

Prepared by the
NCTET Executive Board and Policy Committee

NCTET

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Disclaimer: This position paper has been prepared and is being distributed in order to facilitate understanding of education and training requirements that must be addressed in the development of America's National Information Infrastructure. It represents a consensus of opinions held by representatives of national professional education, training, and trade associations participating in the National Coalition for Technology Education and Training collaboration, and does not necessarily imply endorsement by organizational participants in the committee process or government personnel who attended meetings of the committee.

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NATIONAL COALITION FOR TECHNOLOGY EDUCATION & TRAINING

1997 Educational Technology Goals, Progress, and Recommended Actions

Prepared by the NCTET Executive Board and Policy Committee

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June 1997

National Coalition for Technology Education & Training

1997 Educational Technology Goals, Progress, & Recommended Actions

Purpose of This Report

Technology is essential for extending and enhancing both teaching and learning. Without technology, students and the community are deprived of a tool that is becoming increasingly necessary to enable people to function effectively in contemporary society. In addition, a majority of business and industry leaders view technology literacy as a prerequisite for most jobs. In order to make the most of technology, however, effective planning, as well as quality instruction and professional development, up-to-date curriculum, and performance standards, must drive its utilization.

This report, an update of the National Coalition for Technology Education & Training's (NCTET) 1994 *National Information Infrastructure Requirements for Education and Training*, is intended to serve as a guide for national and state policy makers and planners concerned with the role of technology in education. It begins with a review of recent documentation on the benefits of technology. The review is followed by a description of the extent to which the four established national goals for technology in education have been implemented. Specific details of the progress already made toward accomplishing these goals, unmet needs that deter their accomplishment, and actions required to continue progress toward their realization are included in each section. NCTET has added a fifth goal to address the need for support resources essential to ensure that the first four goals are implemented in a timely and equitable manner.

Sources of information for this report include the U.S. Department of Education, Office of Educational Technology document *Getting America's Students Ready for the 21st Century* (1996), input from more than 500 educators participating in an online forum on education technology, and the National Information Infrastructure Advisory Council's *Kick Start* report. Associations and businesses represented by NCTET have furnished extensive information. A wide variety of recent reports on the impact of technology are also cited.

Documenting the Benefits of Technology in Education

Extensive research and evaluation studies based on the uses of technology to address specific educational needs have amply documented the benefits of technology to support and improve teaching and learning. It is clear from these studies, however, that although technology can play an important role in bringing about desired educational reforms, educators must first be committed to those reforms to make them work.

Research shows that technology not only helps learners master and apply appropriate academic skills, but also helps them acquire new skills related to the use of technology itself. By the 21st century, 60 percent of all jobs in the nation will demand skills in computer and network use. This means that any student who does not know how to perform basic computer functions—using word processing, spreadsheets, databases, networks, and operating systems—will be at a distinct disadvantage.

Following are the major conclusions from recent studies on the benefits of technology for education.

- Students in technology-rich learning environments perform well on standardized tests, developing a variety of competencies not usually measured, including: increased social awareness and self-confidence, increased capacity to communicate effectively about complex processes, more independent learning, increased self-initiative, spontaneous sharing of ideas, ability to perform higher-quality assignments, higher attendance, improved writing skills, improved higher-order thinking skills, and more efficient recall of facts.

- When integrated into the curriculum, the Internet extends learning opportunities for students by increasing their motivation and skills on independent research, interpersonal communications, and written expression, while significantly extending learning beyond the walls of the classroom.

- Distance learning, delivered via live interactive transmissions, improves student achievement at least as much as traditional methods of teaching, while expanding student access to high-quality instruction previously unavailable to rural schools.

- While telecommunications facilitates interchanges between teachers and learners, it is the actions of educators and not the technology that will initiate and sustain desired educational change.

- Carefully planned and targeted use of technology can result in educational gains for all learners regardless of age, race, parental income, or other diverse characteristics.

Research and experience further show that the educational opportunities and benefits cited above tend to exist when there is a ratio of five students to one modern multimedia computer, rather than the more typical ratio of 35 students to one computer. The process of learning in the classroom is significantly enriched as students have access to new and different types of information, can manipulate it on the computer through graphic displays or controlled experiments

in ways never before possible, and can communicate the results and their conclusions in a variety of media to their teachers, to students in the next classroom, or to other learners around the world.

Implementing the Technology Goals for Education

The Telecommunications Act of 1996 and the Improving America's Schools Act (IASA) provide the legislative authority for the President and Congress to implement the Technology Literacy Challenge—an initiative designed to energize the nation to make young Americans technologically literate by the turn of the century. Its challenge is directed toward both the public and private sectors, as well as to educators and local communities and is intended to help implement the four goals around which this report is framed. An additional goal of coordinated support necessary for implementing the other four has been added by NCTET. The five goals are:

Goal 1: Professional Development: All teachers in the nation will have the training and support they need to help students integrate technology into the instructional program.

Goal 2: Access to Technology: All teachers and learners will have access to modern multimedia computers in their classrooms.

Goal 3: Connectivity to the Information Superhighway: Every classroom will be connected to the information superhighway.

Goal 4: Effective Technology-based Learning Resources: Effective software and online learning resources will be an integral part of every school's curriculum.

Goal 5: Coordinated Support for Implementation of Technology in Education: Support for the implementation and application of public and private education technology initiatives and resources will be coordinated at the national, state, and local levels.

The following sections provide: (1) a brief sample of relevant initiatives and activities to support attainment of each goal, (2) current remaining needs relevant to attainment of each goal, and (3) possible actions to be taken for implementing each goal.

Goal 1: Professional Development

All teachers and school administrators in the nation will have the training and support they need to help students integrate technology into the instructional program.

Professional development is key to effective technology integration, extended educational opportunities, and increased student learning. Educators need access to technology and ongoing support to accompany the training and professional development. In addition, educators need adequate time and resources to acquire the new knowledge skills to integrate technology into their schools' existing programs and activities.

Current Progress Toward Meeting Goal 1

At the national level:

- The *Technology Literacy Challenge Fund* (TLCF) distributes $200 million to states for school district grants to support implementation of the four goals, with a particular emphasis on teacher-staff development.
- The *Technology Innovation Challenge Grants* (TICG), now in their second year, offer development, validation, and dissemination of promising practices and programs to support the effective use of technology by educators and its integration into the curriculum.
- The *Improving America's Schools Act* (IASA) regional *Comprehensive Assistance Centers* (CAC) deliver staff development allowing the integration of technology into curriculum and instruction.
- Six *Regional Technology in Education Consortia* (RTEC) have been established and funded by the IASA to disseminate information and provide training that assists educators to utilize technology.
- Apple Computer Inc. has instituted nationwide staff development and technology leadership training based on more than 10 years of research with the *Apple Classroom of Tomorrow* (ACOT) research project.
- IBM has instituted a program known as EduQuest to promote awareness and training of teachers and administrators in the application of cutting-edge technology.
- Professional organizations including the International Society for Technology in Education (ISTE), the National Education Association (NEA), the Consortium for School Networking (CoSN), the National School Boards Association (NSBA), and the Council of Chief State School Officers (CCSSO) continue to disseminate valuable information about products and resources that can be adapted at school sites via newsletters and their own web sites.
- The *Council of Chief State School Officers* (CCSSO) is expanding its *State Education Improvement Partnership Program* to support states in the development and implementation of the Technology Literacy Challenge Fund (TLCF) plans.
- Major national conferences such as the *Technology + Learning Conference* sponsored by the National School Boards Association (NSBA), TelEd, and the *National Education Computing Conference*, help to disseminate information about technology and provide forums and opportunities for educators to share it.
- The Internet has emerged as a major electronic repository and delivery vehicle of education technology and telecommunications staff development resources for educators.

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- *The National Educational Technology Plan* produced by the U.S. Office of Educational Technology offers examples of effective ways to apply a variety of technologies in schools.

- Goals 2000 provides a financial incentive for many states to support state and local planning for staff development that promotes integration of technology with national, state, and local educational standards and goals.

- Star Schools Distance Learning Programs directly serve large numbers of both urban and rural teachers and learners with interactive distance learning in all curriculum subjects. These programs combine the Internet with video.

- A wide variety of projects addressing specific education technology applications include models for developing teachers' capacity to use technology effectively and apply it to educational reforms. Models that deliver staff development programs via telecommunications, distance education, and video teleconferencing can be found in projects supported by Star Schools, the National Science Foundation (NSF), the Department of Defense (DoD), the National Telecommunication and Information Administration (NTIA), the National Air and Space Agency (NASA), among others.

- The 21st Century Teachers initiative administered by The McGuffey Project, is intended to encourage teachers to mentor their colleagues in the use of technology. It is supported by a partnership of professional associations and technology and telecommunications companies.

- The *Telemation Telementoring Support System*, begun in California, is now available in other states to support teacher-staff development on instructional applications of the Internet.

- The *Well Connected Educator* (WCE) program, one of many National Science Foundation projects supporting teaching in technology applications, facilitates electronic sharing of well-documented applications of the Internet as an educational resource.

At the state level:

- Standards adopted in September 1995 by the National Council for the Accreditation of Teacher Education (NCATE) require that all students in teacher education programs take at least one course in the integration of technology into teaching and learning.

- Many states have developed and implemented state education reform and technology plans that facilitate the dissemination of information about the effective applications of technology in education.

- Some states have established or modified regional education units and county education offices to deliver staff development to their school districts.

- Model technology schools have been established in several states to demonstrate effective applications of technology in education.

- Telementoring programs such as the Telemation Project in California in which state telementors train local telementors to train and support teachers at schools sites, have been established in several other states.

- Several states have developed technology-related teacher certification standards. It is not yet known, however, to what extent such standards influence the actual preparation of teachers for effective classroom application of technology.

- Pacific Bell has established an award-wining web site to assist teachers in planning and integrating technology into the curriculum.

- The US West/NEA Teacher Network is an effective example of a partnership of a professional organization and a telecommunications corporation formed to support the professional development of teachers.

Current Needs

- Among all public schools, only 20 percent of teachers use advanced telecommunications for teaching.

- Only 13 percent of school districts and teacher certification agencies require advanced telecommunications training for teacher certification.

- Eighty-six percent of public school teachers receive less than eight hours of training in the use and integration of education technology in a given year.

- At least 50 percent of teachers have little or no experience with technology in the classroom.

- Most current professional development is in the form of one-time seminars that are insufficient to bring the teaching profession up-to-speed with emerging technologies.

- In 1997, only 18 states require training in technology for all teachers seeking certification, and only five require technology training as part of teacher in-service programs.

- Existing staff development programs that promote current educational reforms often do not include technology applications that would assist such reforms.

- Many educators report difficulty obtaining information about either public or private providers of effective staff development or education technology resources.

- Few educators and students have access to or are aware of the many education technology programs and resources developed by federal agencies.

- Although 30 percent of the annual education technology budget is recommended for professional development, the typical allocation is 10 percent.

- State and local instructional plans and programs often do not include the integration of education technology.

Actions Needed

The following nine actions are recommended to help achieve Goal 1:

1.1 Develop and implement *Technology Literacy Challenge Fund* (TLCF) plans to include professional development programs supported by Goals 2000, Title I, Comprehensive Assistance Centers, the Individuals With Disabilities Education Act (IDEA), School-to-Work programs, and other national reform initiatives.

1.2 Ensure that *Technology Literacy Challenge Fund* (TLCF) plans include a funding allocation of at least 30 percent for professional development.

1.3 Ensure that national, state, regional, and local planning for education technology provides for adequate professional development and follow-up support to teachers and administrators.

1.4 Determine the current capacity of Regional Education Laboratories, Regional Technology Centers, and other institutions to help support education and training activities related to the use of technology in education.

1.5 Establish a national one-stop electronic information and resource center to identify and disseminate effective practices, programs, and products that promote integration of technology into current and emerging education reform.

1.6 Review and analyze the emerging findings on technology and reform resulting from the *Technology Innovation Challenge Grants* program.

1.7 Ensure that budgets specified for education technology and telecommunications allocate at least 30 percent funding for professional development of both teachers and administrators.

1.8 Make use of the *Star Schools*, *Technology Innovation Challenge Grants*, National Air and Space Agency (NASA) K-12 education programs, National Science Foundation Programs, and other federally-supported resources when designing and implementing professional development programs.

1.9 Establish a national and state-by-state assessment of both access to and effectiveness of professional development programs in meeting the needs of teachers and school administrators.

GOAL 2: ACCESS TO TECHNOLOGY

All teachers and learners will have access to modern multimedia computers in their classrooms.

To make technology a viable instructional tool, schools must have enough computers to provide full and easy access for all students, including those with disabilities. Although the national student-to-computer ratio is currently 11:1, the ratio of students to powerful multimedia computers is 35:1. Studies suggest that full, easy access with a ratio of about five students to each multimedia computer is necessary to obtain the educational benefits that technology can facilitate.

Current Progress Toward Meeting Goal 2

- Several states and consortia of counties and school districts have established multi-agency bid-request procedures that allow for group or bulk purchasing discounts for computers, software, and other equipment.
- Several national and local organizations are matching school districts that need equipment with companies that can contribute appropriate equipment to them. Refurbishing, upgrades, and technical assistance to the schools are important elements of these arrangements.
- Several companies are currently working to develop lower-cost computers or new ways of networking computers within schools and districts that could dramatically increase the buying power of schools.
- The U.S. Department of Education is advising manufacturers that new technologies should be designed to meet the individual learning needs of students with disabilities.
- A significant increase in the ratio of computers to students has occurred over the past five years.
- A marked increase in the number of bond issues for technology was noted in 1994 and 1995 in at least 20 states.

Current Needs

- The number of students per computer, now ranging nationwide from 15 to 88, needs to be decreased to meet the U.S. Department of Education recommendation of five students to one computer.
- Currently, the majority of computers available in schools have fewer capabilities and functions than up-to-date multimedia machines. Many of the older and less powerful computers in schools are unable to run the latest software or access the Internet.
- More than half of all U.S. schools still report that the majority of their computers are in computer labs. Only when computers are installed throughout school buildings will students have regular access to them during the school day and in class.

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- While businesses, researchers, and non-profit organizations are developing innovative strategies and tools to make technology accessible to students with disabilities at home, in school, and in the community, technology remains inaccessible for many students with disabilities.

- Major inequities exist between schools, districts, counties, and states with respect to access to computer hardware and other technology resources in schools.

Actions Needed

The following six actions are recommended to help achieve Goal 2:

2.1 Enactment of new state legislation to achieve equitable access for students to education technology, including augmented financial support of the *Technology Literacy Challenge Fund*.

2.2 Provision of sufficient information to all education agencies to determine that informed decisions based on local educational needs guide the planning and procurement of hardware and software.

2.3 Planning and implementation related to connectivity to ensure that hardware and multimedia products be adequate to accommodate the requirements of new software and Internet resources.

2.4 Establishment of voluntary national and state guidelines or standards to ensure proper utilization of equipment.

2.5 Encouragement of policies to promote adequate access to education technology in appropriate learning environments, including homes, libraries, and community centers.

2.6 Establishment of new state chapters of the U.S. TechCorps and intensification of its overall activities as a means of encouraging the involvement of business and industry in supporting the hardware needs of schools.

GOAL 3: CONNECTIVITY TO THE INFORMATION SUPERHIGHWAY

Every classroom will be connected to the information superhighway.

Connections to local area networks (LANs) and the Internet turn computers into versatile and powerful learning tools. Access to these networks introduces learners and teachers to people, places, and ideas to which they might otherwise not be exposed.

Current Progress Toward Meeting Goal 3

- By fall 1996, 65 percent of U.S. public schools had access to the Internet. This represented a gain of 15 percentage points per year in 1994 and 1995.

- By fall 1996, 14 percent of all public school instructional rooms were connected to the Internet, a fourfold increase from fall 1994, when only three percent of all instructional rooms had Internet access.

- In 1996, 55 percent of schools indicated that funding was a major barrier to the acquisition or use of telecommunications, down from 69 percent in 1994.

- Of the 35 percent of schools that do not have Internet access, 95 are expecting to obtain Internet access by the end of the century.

- In the 18 months from January 1995 to June 1996, the number of schools with World Wide Web sites on the Internet grew exponentially from 134 to 2,850.

- The U.S. TechCorps was established as a national and state business-driven effort to stimulate local volunteerism in assisting schools to plan, access, and implement technology.

- Due to significant industry support, along with the efforts of 250,000 NetDay volunteers in all 50 states, an estimated 25,000 classrooms in all 50 states have been wired for potential connection to the Internet.

- The National Telecommunication and Information Administration (NTIA) continues to fund projects for the development of innovative applications of telecommunications in education.

- The *Kick Start* report produced by the National Information Infrastructure Advisory Committee (NIIAC) provided initial guidelines on costs for connecting schools and some general suggestions on technology integration.

Current Needs

- While 35 percent of all schools still have not been connected to the Internet, 85 percent of all classrooms are without Internet access.

- Urban and rural schools, high-poverty schools, and elementary schools are not only least likely to have Internet connections, but also are least likely to have plans for such connections.

- Lack of funds remains the number one barrier to widespread use of technology and telecommunications in schools.

- Forty-seven percent of schools cite too few access points within school buildings, and 40 percent cite the lack of equipment or poor quality of available equipment.

- Technology representatives of local educational agencies report a lack of knowledge on how to take advantage of the universal service provisions of the Telecommunications Act of 1996.

- Most states report a need to develop, in concert with the Federal Communications Commission (FCC), guidelines

for helping school districts apply for discounts under the provisions of the Telecommunications Act of 1996.

- Many states report a need to develop working relationships with public utilities and service commissions to obtain discounted telecommunications rates for schools.

- A review of state technology plans shows a lack of technical specification about the extent of access to and the process for connecting schools to the information superhighway.

- States (particularly larger ones) report a lack of funding to conduct assessments of the extent of connectivity and use of the Internet in schools and classrooms.

Actions Needed

The following seven actions are recommended to help achieve Goal 3:

3.1 Adoption by the Federal Commission Commission (FCC) of regulations that guarantee use of the universal service fund to subsidize discounted telecommunications rates to schools.

3.2 Documentation and discussion by the state Technology Literacy Challenge Fund planners on telecommunications needs, plans, costs, and strategies for procuring discounted access and use rates.

3.3 A concerted effort by the 50 state education agencies, the Federal Communications Commission (FCC), and the U.S. Department of Education to expedite a process for assisting local education agencies to develop telecommunications plans that guide their applications for the discounted rates made possible by the Telecommunications Act of 1996.

3.4 Encouragement of state education agencies to work with public utilities and service commissions to promote the use of universal service funds to support public schools and libraries.

3.5 Concerted efforts by national and state professional association and media providers to work with federal agencies to increase public awareness of the opportunities for students and teachers afforded by the Technology Literacy Challenge Fund programs and the Telecommunications Act.

3.6 Help to schools and libraries from the U.S. TechCorps with business and industry to plan and utilize existing and anticipated connectivity to the information superhighway.

3.7 Provisions and funding for technology upgrading in all plans for construction of new libraries and schools.

GOAL 4: TECHNOLOGY-BASED LEARNING RESOURCES

Effective software and online learning resources will be an integral part of every school's curriculum.

Technology is only as effective as its instructional content and the appropriateness of hardware and software to deliver that content to the user. Computer software, video, distance learning courses, and online resources are expanding rapidly. For example, more than 20,000 educational software titles are now available; more than a million students take courses through distance learning networks every year; and every day hundreds of new home pages are added to the Internet's World Wide Web. These resources hold promise of improved learning. By engaging learners in problem-solving, research, and data analysis, they will also increase the amount of time students spend in learning activities. With such a proliferation of resources, there must be curriculum and instructional guidelines to help structure the development of online resources and courseware to assure challenging education content that reflects overall educational goals at the national, state, and local levels.

Voluntary, challenging education standards are needed to help guide the development of technology-based resources. Developers of online resources and software utilize existing curriculum frameworks and a variety of standards to guide content development.

Current Progress Toward Meeting Goal 4

- *Technology Innovation Challenge Grants* (TICG) are beginning to produce promising on-line resources with a potential for widespread dissemination to schools across the country.

- The *Technology Literacy Challenge Fund* (TLCF) is expected to result in statewide plans to support the adoption and expansion of technology-based learning resources established under the Technology Innovation Challenge Grant program and other federal programs, as well as those of commercial software publishers.

- The U. S. Department of Education continues to produce and expand the *Star Schools* programs, which now typically provide a combination of satellite- and Internet-based delivery of distance education and staff development that supports national education standards.

- The *Department of Defense Presidents Technology Initiative* is funding the development of multimedia products and educational applications of the Internet that support national education standards.

- The Defense Advanced Research and Projects Agency (DARPA) has funded research and development projects to adapt and transfer defense training research and development to support K-12 education in the DoD Schools with the intent of disseminating the best of these adaptations to state public school systems.

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- In an effort to integrate technology into curriculum and instruction, state and school district plans are emphasizing the use of technology to support and enhance state and local curriculum frameworks and standards.

- The National Science Foundation (NSF), among other federal bodies, is increasing its online interactive and collaborative Internet-based projects to engage greater numbers of students in conducting scientific research and problem-solving.

- Many teachers and students are creating World Wide Web pages for their schools that include portfolios of best works, virtual tours, and special projects.

- Digital libraries are already providing access to comprehensive databases of information in the Library of Congress, the American Museum of Natural History, the John F. Kennedy Center for the Performing Arts, and other cultural centers.

- California has established the *California Instructional Technology Clearinghouse* (CITC), which maintains a database of Internet-based resources and software reviewed, tested, and evaluated by educators. This information may be accessed nationwide through the CITC web site.

Current Needs

- More software relevant to local curriculum is needed to supplement and extend information and knowledge contained in traditional print materials.

- A recent Rand study indicates that software use by students at home is heavily skewed to higher-income families, because wealthy families are many times more likely to own computers than poor families.

- The Rand study also reports that software companies avoid developing substantial educational software for school use, because they consider the school market unprofitable.

- Measures of student achievement from using specific software programs are unavailable to many states, schools, and families to guide software purchase.

- More effective strategies are needed to help teachers and students select accurate, up-to-date, high-quality information from the staggering range of material available on the Internet.

- State and local technology plans are needed to describe and implement technology as a catalyst for desired educational reforms, rather than as a discrete educational resource unrelated to the curriculum.

Actions Needed

The following 11 actions are recommended to help achieve Goal 4:

4.1 Provide for both federal- and state-supported incentives to business to invest in large-scale development of comprehensive multimedia and Internet-based education resources.

4.2 Describe and document ways that technology can support and extend the intentions of the national education standards.

4.3 Develop strategies to facilitate assessment of the contributions of technology to teaching and learning.

4.4 Provide best-practice models to help inform state planners and policy makers of effective uses of technology to support challenging education standards.

4.5 Work with private sector partners to establish technology-literacy standards and guidelines to prepare students for work.

4.6 Establish an ongoing dialogue between the representatives of technology-producing companies and educational institutions to develop quality, learner-friendly software and video programming.

4.7 Commit to national education goals that can guide the development of learner-friendly software, video programs, and Internet resources.

4.8 Ensure that education technology can accommodate to a wide range of education and skill levels, as well as the needs of a demographically-diverse population.

4.9 Develop and implement policies and procedures to protect copyrights on electronic media.

4.10 Establish a process to determine appropriate voluntary baseline requirements to enable education technology programs, products, and practices to be easily adopted or adapted by schools throughout the country.

4.11 Educate the public about the dangers of allowing our education system to lag behind the needs of the workplace as we prepare learners for life in the 21st century.

GOAL 5: COORDINATED SUPPORT FOR IMPLEMENTATION OF TECHNOLOGY IN EDUCATION

Support for the implementation and application of public and private education technology initiatives and resources will be coordinated at the national, state, and local levels.

The rapid increase of interest in technology as a vehicle to extend teaching and learning opportunities has resulted in a proliferation of agency- and organization-sponsored programs through conferences, online information resources, grants, reform initiatives, and distance learning courses. This proliferation has caused a replication of efforts that, if combined, could leverage each other and thereby give greater emphasis to the information superhighway.

Since 1994, many attempts have been made to address the national coordination of education technology and training initiatives. Although much more must be done to increase coordination and leveraging of resources to support effective applications of education technology, a few effective examples of coordinated technology support are listed below.

Current Progress Toward Meeting Goal 5

- The U.S. Office of Educational Technology has issued a report that promotes the establishment of education/business partnerships.
- Technology challenge grants have been made possible with the Improving America's Schools Act (IASA) resulting in 19 exemplary web sites that can serve as models for community agency and business partnerships. These models:
    1. Help educators increase their awareness of and capacity to use technology effectively through the coordination of local resources.
    2. Enable the federal government to participate in forums, to develop consensus on policies, and to share information in ways that facilitate national coordination of resources to support education and the information infrastructure.
- The *Computer Assisted Education and Training Initiative* (CAETI) and the *White House Courseware Development Initiative* have been introduced by the Department of Defense to support coordination and leveraging to Department of Defense dependent schools—and ultimately to public schools throughout the U.S.—the innovations and instruction improvements resulting from extensive research and development projects in military technology.

Actions Needed

The following nine actions are needed to help achieve Goal 5:

5.1 Evaluate the existing coordination efforts to determine effective strategies for inter-agency, interstate, and federal-to-local facilitation of national information infrastructure requirements.

5.2 Conduct a comprehensive analysis of the existing studies and resources to support technology and telecommunications planning and implementation and to determine the specific gaps or areas of need for a national center to facilitate efficient and equitable access to the technology-resource opportunities made possible by the national initiatives.

5.3 Establish a national support center and resource clearinghouse to help build the capacity of states, regional agencies, and school districts to implement and sustain the current and emerging education technology and telecommunications initiatives in a timely and equitable manner.

5.4 Continue efforts to establish an Interagency Technology Office (ITO) that would bring federal agencies together to collaborate on the joint development and dissemination of projects and programs involving learning technologies.

5.5 Determine the current capacity of the Regional Education Laboratories, Regional Technology Centers, Comprehensive Assistance Centers, U.S. TechCorps, and other agencies and initiatives to help coordinate education and training activities related to the use of technology in education.

5.6 Include language about technology integration in any new legislation related to education reform, and conversely, include language on education reform in new technology and telecommunications legislation as appropriate.

5.7 Ensure that future national education research programs and projects investigate the use of technology as a catalyst for promoting desirable education reforms and then use these research findings to inform changes in teacher preparation and staff development programs.

5.8 Help increase the capacity of state education agencies to develop, implement, and assess the impact of Technology Literacy Challenge Fund (TLCF) plans, the universal service provision of the Telecommunications Act, and other initiatives designed to enable all schools to take full advantage of current and emerging technologies.

5.9 Help state regulators, businesses, legislators, and the public-at-large to become more aware of how technology-rich environments can enhance both teaching and learning.

CONCLUSION

This document provides information that can be adapted by education agencies, organizations, and businesses to assist in the development of policy statements for their own use. It is intended that this be a working paper that will be updated as needed. The National Coalition for Technology Education and Training welcomes your reactions and comments regarding this document and its potential use.

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